

Listing of Claims:

Claims 1 to 17 (Cancelled)

18. (Currently amended) A mold of a type for dies and molding of articles and requiring heat to be taken from the mold from time to time, wherein the mold includes at least one completely closed chamber with air substantially removed therefrom to provide a closed system after [the] liquid is supplied to the mold and each said at least one completely closed chamber [being] is provided with a single quantity of unchanged liquid therein after the liquid is supplied to the mold which extends to cover at least one of the areas from which heat is to be taken, said single quantity of unchanged liquid being fed through and guided by a first conduit communicating with said closed chamber and a space above the single quantity of liquid in said closed chamber and within each of said at least one completely closed chamber and a second conduit communicating with said first conduit and said closed chamber and the space above the single quantity of liquid to form a passageway for vapor to exit from and to be supplied from said completely closed chamber through said second conduit to a condensing or heat exchange means wherein pressure is at a level which is governed solely by the temperature of the single quantity of liquid which therefore can boil at any selected temperature when the temperature of the single quantity of water is higher than the temperature of the heat exchange means, and said single quantity of liquid communicates with said condensing means to effect, by cooling, condensation of the vapor or vapors from the single quantity liquid in the space flowing through said second conduit so that there is a saturated state of the vapor in the space, the single quantity of liquid having a volume such that it has an upper level above one of the areas of the mold to be cooled and substantially only the vapor of the liquid within the chamber above the passageway and the upper level of the liquid so that the completely closed chamber keeps the same single quantity of liquid through the full cooling process and the total overall temperatures of the mold is kept relatively uniform and provides for effective heat transmission throughout the mold during the molding process and the vapor after passing through said condensing or heat exchange means returns by gravity as a liquid solely to said liquid in the mold through said first conduit.

19. (Currently Amended) A mold as claimed in claim 18, wherein the chamber is shaped to follow the shape of molding surfaces and positioned so that all of the working surfaces of the mold are serviced equally by the liquid therein and the single quantity of unchanged liquid will have effective access to each of the areas of the mold from which heat is to be taken and the same single quantity of unchanged liquid flows back to the body of the liquid in the completely closed chamber whereby the temperature across the working surfaces of the mold is substantially uniform.

20. (Currently amended) A mold as claimed in either claim 18 [or 19], wherein the [single quantity of liquid is] vapor only is within the space in the chamber above the liquid level [vapor only] with the liquid level varying due to boiling of the liquid to thereby achieve a substantially uniform temperature profile across the working surfaces of the mold.

21. (Cancelled)

22. (Cancelled)

23. (Cancelled)

24. (Currently Amended) A mold [as claimed] for use with a mold of the type for dies and molding of articles as defined in either claim 18 or 19, wherein the mold is used as a mold for molding plastic materials, a die mold for casting of metals, injection molding of plastic material and a mold for molding by thermoforming of plastic materials.

25. (Currently amended) A mold arrangement including a mold and a condensing/heat exchanger means within the mold arrangement, said mold having an internal cooling arrangement which is a completely closed chamber having air substantially removed therefrom and having therein a single quantity of liquid with a volume such that it has an upper level in said completely closed chamber above at least some of the areas of the mold to be cooled and has substantially only the vapor or vapors in a space within the upper level within the chamber above the top of the liquid and said condensing/heat exchange means using the same single quantity liquid to effect, by

cooling, condensation of the vapor or vapors of the liquid, said completely closed chamber being integrated with the mold, and total overall temperature of the mold is maintained relatively uniform and the cooling condenses the vapor or vapors derived from the single quantity of liquid used by the condensing/heat exchange means and the condensed liquid is returned solely by gravity to the single quantity of liquid..

26. (Currently amended) A mold for injection molding of plastic materials having an internal cooling arrangement which is a completely closed chamber partially filled with a single quantity of liquid having an upper level sufficient that at least some areas of the mold within the chamber adjacent to parts of the mold to be cooled are accessed by the single quantity of liquid when the mold is in use and provided in a space [in] within the completely closed chamber above the liquid and the vapor is derived from the single quantity of liquid, and condensing means within [this] said space using the same single quantity of liquid in the completely closed chamber, said condensing means including a condensing area, a first passageway having one end forming a liquid outlet from said condensing area and a second end forming a liquid inlet to said liquid below said upper level and a second passageway separate from said first passageway having one end forming a vapor outlet from said vapor above said upper level and a second end coupled to said condensing area, and vapor or vapors formed from heat of vaporization is extracted through said second passageway and the vapor is condensed into liquid in said condensing area and returned by gravity to said lower level of the liquid through said first passageway.

27. (Currently amended) A mold for injection molding of plastic materials for dies and articles using dies which provides for effective heat transmission throughout the mold, the mold having an internal cooling arrangement using a single cooling liquid and includes a completely closed chamber having air substantially removed therefrom and partially filled with a vapor and partially filled with the single cooling liquid with an upper level of sufficient height so that at least some areas of the mold within the completely closed chamber and adjacent parts of the mold to be cooled are accessed by the single cooling liquid when the mold is in use and, in a space in the chamber above the

liquid, substantially only the vapor which is derived from the single cooling liquid, and an arrangement to provide cooling of any vapor using the single cooling liquid within the space in the chamber above the liquid level to effect at least some condensation of the vapor thereby so that the overall temperature of the mold is kept relatively uniform and heat is dissipated by the cooling of the vapor, said condensing means including a condensing area, a first passageway having one end forming a liquid outlet from said condensing area and a second end forming a liquid inlet to said liquid below said upper level and a second passageway having one end forming a vapor outlet for the vapor above said upper level and a second end coupled to said condensing area, and vapor or vapors formed from heat of vaporization is extracted through said second passageway and the vapor is condensed into liquid in said condensing area and returned by gravity to said lower level of the liquid through said first passageway whereby said first and said second passageways are separate from each other.

28. (Previously Presented) A mold as in preceding claim 25 where the liquid is water.

29. (Previously Presented) A mold as in preceding claim 25 wherein the vapor is water vapor.

30. (Currently Amended) A mold as claimed in either claim 26 [or 27], wherein the mold is a die, and said completely closed chamber [including] includes said condensing means and said first and said second passageways, and [including] at least a heating means located within the chamber within the liquid such that during a standby time, the temperature of the die or mold can be kept within a selected range of temperatures.

31. (Currently Amended) A mold as claimed in claim 26 or 27 wherein the internal cooling arrangement additionally includes cooling means comprising a tube forming said second passageway, a core in the tube and means to direct cooling water as the single quantity of liquid flowing through the tube.

32. (Currently amended) A method of cooling of working parts of a mold for dies and articles using dies [where] wherein the mold has at least one completely closed chamber having air substantially removed therefrom and having a single quantity of liquid therein which extends to cover at least one of the areas from which heat is to be taken, and a vapor space above the single quantity of liquid and within the completely closed chamber in which pressure within the vapor space is caused to be set at a level which will enable the single quantity of liquid to boil at a selected temperature, said selected temperature being at a level such that the temperature is below a temperature of the area from which heat is to be taken and this being by reason of, as a first step, partially filling each of said at least one completely closed chambers with the liquid through a first passageway below upper level of the liquid and then extracting air containing a vapor from the vapor space above the liquid through a second passageway separate from said first passageway so that there is substantially only the vapor or vapors of the liquid within the completely closed chamber above the upper level of the liquid which can pass through said second passageway to condensing means, and passing at a selected cooling temperature, liquid through said condensing means to effect, by such cooling, condensation of vapor derived from the single quantity of liquid in the vapor space and return by gravity through said [second] first passageway which exits into [to] the liquid below the upper level of the liquid in said completely closed chamber.

33. (Currently Amended) A method of cooling of working parts of a mold for dies and molding of articles using dies [where] wherein the mold has at least one completely closed chamber having air substantially removed therefrom and having a single quantity of liquid therein which extends to cover at least one of the areas from which heat is to be taken, each of said at least one completely closed chamber being integrated with the mold and a space above the single quantity of liquid and within the completely closed chamber in which pressure within the space is caused to be set at a level which will enable the single quantity of liquid to boil at a selected temperature, said selected temperature being at a level such that the temperature is below a temperature of the areas from which heat is to be taken this being by reason of, as a first step, filling of

the completely closed chamber with the single quantity of liquid and then extracting a selected portion of the single quantity of liquid without allowing air to replace the extracted liquid, and passing at a selected cooling temperature, the single quantity of liquid through condensing means to effect, by such cooling, condensation of vapor of the single quantity of liquid in the space to return the condensed vapor to the single quantity of liquid by gravity.

34. (Previously Presented) A method as claimed in claim 32 or 33 wherein the single quantity of liquid is water.

35. (Previously Presented) A mold arrangement as claimed in claim 27, wherein the mold is a die, and including at least a heating means located within the chamber within the liquid such that during a standby time, the temperature of the die or mold can be kept within a selected range of temperatures.

36. (New) A mold of a type for molding of an article and requiring heat to be taken therefrom during molding of the article, said mold comprising at least one completely closed substantially uniform surface temperature maintaining chamber containing a liquid only partially filling the chamber with substantially only the vapor of the liquid filling the remainder of the chamber,

said temperature maintaining chamber surrounding a volume or structure defining a cavity having a side in common with a wall of said chamber forming a common wall portion with said chamber and said volume or structure defining the cavity, and

at least one condenser arrangement positioned at an upper location of the chamber and having at least one passageway therethrough for receiving coolant therethrough, and having a wall providing substantial heat conductivity separating the chamber from said at least one passageway,

said common wall portion separating said chamber from the cavity, the wall portion having a surface shape on the chamber side that substantially conforms in shape to the adjacent surface on the cavity side.

37. (New) A mold of a type of molding of an article as claimed in claim 36, wherein said common wall portion defining the wall portion between the chamber and the cavity has a substantially uniform thickness of a consistent heat transferability material.

38. (New) A mold as claimed in claim 36, wherein the chamber is shaped to follow the shape of molding surfaces and positioned so that all working surfaces of the mold are serviced equally by the liquid therein and the liquid will have effective access to each of the areas of the mold from which heat is to be taken and the same liquid flows back to the body of the liquid in the completely closed chamber whereby the temperature across the working surfaces of the mold is substantially uniform.

39. (New) A mold as claimed in claim 36, wherein the vapor within the space in the chamber above the liquid level and the liquid level vary due to boiling of the liquid to thereby achieve a substantially uniform temperature profile across the working surfaces of the mold.

40. (New) A mold as claimed in claim 36, wherein the liquid is a single quantity of unchanged water.

41. (New) A mold as claimed in claim 36, wherein the mold is a die, and including at least heating means located within the chamber within the liquid such that during a standby time, the temperature of the die or mold can be kept within a selected range of temperatures.

42. (New) The mold as claimed in claim 36, wherein the liquid is water used as a coolant to maintain operating temperature below 100°C.

43. (New) The mold as claimed in claim 36, wherein the chamber is maintained at a uniform temperature by using the phase change properties of the liquid, and the cooling chamber is structured such that the distance from all points on the molding surfaces to the surfaces of the chamber are substantially equal, thereby ensuring that temperature differentials between said points and the cooling chamber are as equal as possible.